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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/690,623	10/23/2003	Melvin K. Carter	60937-0202	5933
9629	7590	07/12/2005	EXAMINER	
MORGAN LEWIS & BOCKIUS LLP 1111 PENNSYLVANIA AVENUE NW WASHINGTON, DC 20004			VINH, LAN	
			ART UNIT	PAPER NUMBER
			1765	

DATE MAILED: 07/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

10/690,623

**Applicant(s)**

CARTER ET AL.

**Examiner**

Lan Vinh

**Art Unit**

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 23 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8, 10-12 and 14-16 is/are rejected.
- 7) ☒ Claim(s) 9 and 13 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

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## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Weinstein et al (US 6,902,590) in view of Tran et al (US 6,602,112)

Weinstein discloses a method for CMP. The method comprises the steps of:

providing a substrate, said substrate being a semiconductor material or memory device material and having a surface comprising copper (col 3, lines 9-11) providing a fluid polishing composition comprising allyloxylbenzenesulfonic acid/organosulfonic acid oxidizer, said organosulfonic acid having a ring structure comprising carbon (col 6, lines 21-27), the allyloxylbenzenesulfonic acid/organosulfonic acid comprises a moiety (col 12, lines 5-8)

providing a pad (col 9, lines 27-28)

moving the pad against the substrate with the polishing composition therebetween to effect chemical mechanical polishing of copper (col 9, lines 16-20)

Unlike the instant claimed invention as per claim 1, Weinstein fails to specifically disclose that the allyloxylbenzenesulfonic acid/organosulfonic acid comprises a sulfonate moiety substituted onto a carbon atom in the ring structure, and a polar moiety substituted onto the ring on an ortho position or from the sulfonate moiety

Tran, in a method for polishing a surface, discloses that sulfonic acid comprises acid moiety substituted onto a carbon atom in the ring structure, and moiety substituted onto the ring on an ortho position (col 3, lines 25-49)

Hence, one skilled in the art at the time the invention was made would have found it obvious that Weinstein's allyloxylbenzenesulfonic acid/organosulfonic acid would have comprised a sulfonate moiety substituted onto a carbon atom in the ring structure, and a polar moiety substituted onto the ring on an ortho position or from the sulfonate moiety in view of Tran teaching because Tran discloses that acid species such as sulfonic acid having at least two acid moieties present in the structure (col 3, lines 25-31)

3. Claims 2-8, 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weinstein et al (US 6,902,590) in view of Tran et al (US 6,602,112) and further in view of Antonell et al (US 6,899,596)

Weinstein and Tran have been described above. Unlike the instant claimed inventions as per claims 2, 10, Weinstein and Tran fail to disclose that the allyloxylbenzenesulfonic acid /organosulfonic acid has an electrochemical oxidation potential greater than 0.7V

Antonell, in a CMP method, discloses that benzene having a dipole moment of less than 1.4 (col 5, lines 11-15)

One skilled in the art at the time the invention was made would have found it obvious to modify Weinstein and Tran by using an allyloxylbenzenesulfonic acid /organosulfonic acid has an electrochemical oxidation potential greater than 0.7V in view of Antonell

teaching because Antonell discloses that benzene is a material having dipole moment of less than 1.4 or it may be non-polar (col 5, lines 11-14)

Regarding claims 4, 7, Weinstein discloses using abrasive (col 7, lines 47-48) and hydroxybenzotriazole (col 8, lines 3-5)

Regarding claim 6, Weinstein discloses using 1% of allyloxylbenzenesulfonic acid/organosulfonic acid (col 3, lines 22-23), 0-3% of abrasive (col 7, lines 45-46)

4. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Weinstein et al (US 6,902,590) in view of Tran et al (US 6,602,112)

Weinstein discloses a method for CMP. The method comprises the steps of:

providing a substrate, said substrate being a semiconductor material or memory device material and having a surface comprising copper (col 3, lines 9-11) providing a fluid polishing composition comprising allyloxylbenzenesulfonic acid/organosulfonic acid oxidizer, said organosulfonic acid having a ring structure comprising carbon (col 6, lines 21-27), the allyloxylbenzenesulfonic acid/organosulfonic acid comprises a moiety (col 12, lines 5-8)

water and abrasive (col 7, lines 45-50)

BTA/corrosion inhibitor (col 8, lines 3-4)

providing a pad (col 9, lines 27-28)

moving the pad against the substrate with the polishing composition therebetween to effect chemical mechanical polishing of copper (col 9, lines 16-20)

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Unlike the instant claimed invention as per claim 12, Weinstein fails to specifically disclose that the allyloxylbenzenesulfonic acid/organosulfonic acid comprises a sulfonate moiety substituted onto a carbon atom in the ring structure, and a polar moiety substituted onto the ring on an ortho position or from the sulfonate moiety

Tran, in a method for polishing a surface, discloses that sulfonic acid comprises acid moiety substituted onto a carbon atom in the ring structure, and moiety substituted onto the ring on an ortho position (col 3, lines 25-49)

Hence, one skilled in the art at the time the invention was made would have found it obvious that Weinstein's allyloxylbenzenesulfonic acid/organosulfonic acid would have comprised a sulfonate moiety substituted onto a carbon atom in the ring structure, and a polar moiety substituted onto the ring on an ortho position or from the sulfonate moiety in view of Tran teaching because Tran discloses that acid species such as sulfonic acid

5. Claims 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Minamihaba et al (US 6,858,539) in view of Tran et al (US 6,602,112) and further in view of Tseng (US 6,455,428)

Minamihaba discloses a method for manufacturing semiconductor device using a post-CMP treating liquid. The method comprises the steps of:

providing a substrate, said substrate being a semiconductor material or memory device material and having a surface comprising copper (col 3, lines 10-12), the substrate comprises residual material from polishing or etching the groove in the substrate (col 2, lines 63-65, col 10, lines 20-21), providing a fluid cleaning composition

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comprising dodecylbenzene sulfonate/organosulfonic acid oxidizer, said organosulfonic acid having a ring structure comprising carbon (col 4, lines 19-22)

contacting the substrate with the cleaning composition for a time (15-60 seconds) to remove the residues (col 8, lines 30-35)

Unlike the instant claimed inventions as per claims 14-15, Minamihaba fails to specifically disclose that the dodecylbenzene sulfonate /organosulfonic acid comprises a sulfonate moiety substituted onto a carbon atom in the ring structure, and a polar moiety substituted onto the ring on an ortho position or from the sulfonate moiety

Tran, in a method for polishing a surface, discloses that sulfonic acid comprises acid moiety substituted onto a carbon atom in the ring structure, and moiety substituted onto the ring on an ortho position (col 3, lines 25-49)

Hence, one skilled in the art at the time the invention was made would have found it obvious that Minamihaba's dodecylbenzene sulfonate /organosulfonic acid would have comprised a sulfonate moiety substituted onto a carbon atom in the ring structure, and a polar moiety substituted onto the ring on an ortho position or from the sulfonate moiety in view of Tran teaching because Tran discloses that acid species such as sulfonic acid having at least two acid moieties present in the structure (col 3, lines 25-31)

Minamihaba fails to specifically disclose contacting the substrate at a temperature

Tseng discloses a method for forming metal silicide comprises the step of contacting the substrate with the cleaning composition at a temperature to remove the residues (col 4, lines 20-21)

One skilled in the art at the time the invention was made would have found it obvious to modify Minamihaba and Tran by contacting the substrate at a temperature as per Tseng because Tseng discloses that an post-CMP clean up, used to remove residues, can be performed using a acidic cleaning solution at a temperature between 100-150° C (col 4, lines 17-19)

6. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Minamihaba et al (US 6,858,539) in view of Tran et al (US 6,602,112) and further in view of Tseng (US 6,455,428)

Minamihaba discloses a method for manufacturing semiconductor device using a post-CMP treating liquid. The method comprises the steps of:

providing a substrate, said substrate being a semiconductor material or memory device material and having a surface comprising copper (col 3, lines 10-12), providing a fluid cleaning composition comprising dodecylbenzene sulfonate/organosulfonic acid oxidizer, said organosulfonic acid having a ring structure comprising carbon (col 4, lines 19-22)

contacting the substrate with the cleaning composition for a sufficient time (15-60 seconds) to remove the residues (col 8, lines 30-35)

Unlike the instant claimed invention as per claim 16, Minamihaba fails to specifically disclose that the dodecylbenzene sulfonate /organosulfonic acid comprises a sulfonate moiety substituted onto a carbon atom in the ring structure, and a polar moiety substituted onto the ring on an ortho position or from the sulfonate moiety



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Tran, in a method for polishing a surface, discloses that sulfonic acid comprises acid moiety substituted onto a carbon atom in the ring structure, and moiety substituted onto the ring on an ortho position (col 3, lines 25-49)

Hence, one skilled in the art at the time the invention was made would have found it obvious that Minamihaba's dodecylbenzene sulfonate /organosulfonic acid would have comprised a sulfonate moiety substituted onto a carbon atom in the ring structure, and a polar moiety substituted onto the ring on an ortho position or from the sulfonate moiety in view of Tran teaching because Tran discloses that acid species such as sulfonic acid having at least two acid moieties present in the structure (col 3, lines 25-31)

Minamihaba also fails to specifically disclose using a resist and contacting the substrate at a temperature to remove the resist

Tseng discloses a method for forming metal silicide comprises the step of using a resist and contacting the substrate with the cleaning composition at a temperature to remove the resist (col 3, lines 49-50; col 4, lines 20-21)

Since Minamihaba discloses forming a groove/contact opening (col 10, lines 20-21), one skilled in the art at the time the invention was made would have found it obvious to modify Minamihaba and Tran by using the resist and contacting the substrate at a temperature as per Tseng because Tseng discloses that photoresist is used as an etch mask to allow contact hole to be created (col 3, lines 49-50) and an post-CMP clean up, used to remove any photoresist residues, can be performed using a acidic cleaning solution at a temperature between 100-150<sup>0</sup> C (col 4, lines 17-19)

***Allowable Subject Matter***

7. Claims 9, 13 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: Regarding claims 9,13, the cited prior art of record fails to disclose or suggest a method of CMP a substrate comprises the step of providing a polishing composition wherein the polishing composition is substantially free of additional oxidizer, in combination with the rest of the limitations of claims 9, 13.

***Conclusion***

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Vinh whose telephone number is 571 272 1471.

The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571 272 1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



LV

July 7, 2005